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HYDRAULIC CIRCUIT FOR CONSTRUCTION MACHINERY

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HYDRAULIC CIRCUIT FOR CONSTRUCTION MACHINERY

[Kensetsu kikai no yuatsu kairo]

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[There are no amendments to this patent.]

Claim

A hydraulic circuit for construction machinery composed of: a hydraulic pump (1) that supplies hydraulic pressure to working machinery through main conduit (13); a solenoid valve (3) furnished in the middle of aforementioned main conduit (13) and that is connected when machine start switch (11) is turned on; a preheat circuit (8) composed of a solenoid valve (9) and a diaphragm (10) connected to it, that is connected to aforementioned main conduit (13), in which the working oil temperature is low, and that is connected when aforementioned machine start

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\* [Numbers in the margin indicate pagination of the original foreign language text.]

switch (11) is turned off; and an oil cooler (6) that operates when the working oil temperature becomes high when aforementioned machine start switch (11) is on.

### Detailed explanation of the invention

#### Industrial field of application

This design relates to a hydraulic circuit for construction machinery that has a preheating circuit for the working oil.

#### Prior art

The viscosity of the working oil used for hydraulic circuits for construction machines in the past changes depending on temperature. The viscosity is high particularly at low temperatures, so the resistance to passage through ducts is large. So there is the problem in that the operating speed of the working machines slows down, causing an impediment to the work.

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#### Objective of the design

This design provides a hydraulic circuit for construction machinery furnished with a preheating circuit to preheat to a certain temperature automatically when the temperature of the working oil is low, and proposes to solve the problems described above.

#### Constitution of the design

A hydraulic circuit for construction machinery furnished with a solenoid valve that is connected when the machine start switch is turned on in the middle of the main conduit that directs oil discharged from a hydraulic pump to the working machine, and a preheating circuit composed of a solenoid valve and a diaphragm connected to it that is connected when the temperature of the working oil is low and the aforementioned machine start switch is turned off. By heating the working oil with the aforementioned preheating circuit when the machine start switch is off and the oil temperature is low, and by cooling with an oil cooler when the oil temperature become high when the machine is in use, the machine can always be driven with the optimal oil temperature.

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#### Application example

The following is a describing an application example of this design by referring to a figure. In the figure, (1) is a hydraulic pump driven by electric motor (2). Hydraulic pressure [sic] discharged from hydraulic pump (1) is supplied to the working machine, which is not shown, through a solenoid valve (3) furnished in the middle of main conduit (13). Return oil from the working machine is drained to tank (7) through oil cooler (6) that has a fan (5) run by electric motor (4).

(8) is a preheating circuit and is composed of a solenoid valve (9) and a diaphragm (10). Discharge pressure from hydraulic pump (1) flows into diaphragm (10) when solenoid valve (9) is connected, and the temperature of the working oil is raised by the heat generated when it passes through diaphragm (10).

At the same time, (11) is a machine start switch that is connected to a power source, not shown, through power switch (16) and is constituted with a double-throw switch. Normally open relay contact (11a) of one switch is connected to electric motor (4) of oil cooler (6) through a high temperature sensing switch (12a) of oil temperature gauge (12) that senses the temperature of the working oil. Normally open relay contact (11'a) of the other switch is connected to exciting coil (3a) of solenoid valve (3) furnished in the middle of main conduit (13) and to electric motor (2) that drives hydraulic pump (1) through a diode (14). Normally closed relay contact (11'b) is connected to exciting coil (9a) of solenoid valve (9) furnished in preheating circuit (8) through low temperature sensing switch (12b) of oil temperature gauge (12), and to electric motor (2) that drives hydraulic pump (1) through a diode (15).

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Next, the functioning is explained. Assuming that the working oil temperature is low and power switch (16) is turned on, simultaneously with electric motor (2) of hydraulic pump (1) being run through low temperature sensing switch (12b) of oil temperature gauge (12), solenoid valve (9) of preheating circuit (8) also comes on. So the working oil discharged from hydraulic pump (1) flows into diaphragm (10) of preheating circuit (8) and after it is heated by the heat generated when it passes through diaphragm (10), is drained to tank (7).

In short, when the temperature of the working oil is low, preheating circuit (8) works automatically to heat the working oil when power switch (16) is turned on, and when the temperature of the working oil reaches a certain value, low temperature sensing switch (12b) of oil temperature gauge (12) goes off and then high temperature sensing switch (12a) comes on.

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Next, when machine start switch (11) is turned on to start work, solenoid valve (3) of main conduit (13) comes on, pressure discharged from hydraulic pump (1) is supplied to the working machine, and simultaneously, solenoid valve (9) of preheating circuit comes on. With this, work can start, and while working, preheating circuit (8) will not work, and discharge pressure from hydraulic pump (1) can be supplied only to the working machine.

Work can also start by turning on machine start switch (11) during preheating, and when the temperature of the working oil becomes high while working, electric motor (4) of oil cooler (6) is driven through high temperature sensing switch (12a) of oil temperature gauge (12), so overheating of the working oil can be prevented.

### Effects of the design

With this design, as described in detail above, a preheat circuit automatically works to heat the working oil when the working oil temperature is low, so problems such as the operating speed of the working machine being slow can be solved. Even when work is started during preheating, the preheating circuit shuts off and discharge pressure from the hydraulic pump is supplied only to the working machine, so it causes absolutely no impediment to working. And when the oil temperature becomes high, an oil cooler works to prevent the oil temperature from rising, so work can always be performed with the optimal oil temperature.

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### Brief description of the figure

The figure is a circuit diagram showing an application example of this design.

(1) is a hydraulic pump, (3) and (9) solenoid valves, (6) an oil cooler, (8) a preheat circuit, (10) a diaphragm, (11) a working machine start switch, and (13) a main conduit.

